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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,382	01/26/2005	Sho Kumagai	Q85951	7993

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EXAMINER	
BRAYTON, JOHN JOSEPH	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/522,382	KUMAGAI ET AL.	
	Examiner	Art Unit	
	John Brayton	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 October 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5 and 7-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 and 7-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED FINAL ACTION

Status of Claims and Rejections

1. Applicant's amendments filed October 14, 2008 have been fully considered but do not place the application in condition for allowance.

2. The Examiner acknowledges that the Applicant did not file an Information Disclosure Statement on May 9, 2007. The Examiner considered, in the Office action dated June 11, 2008, Information Disclosure statements filed on January 26, 2005 and October 19, 2007.

3. All rejections from the previous office action are withdrawn in view of Applicant's amendment. New grounds of rejection under 35 U.S.C. 103(a) are necessitated by the amendments.

4. New claims 9-12 require new grounds of rejection under 35 U.S.C. 103(a).

5. The following claims are now pending: 1-5 and 7-12.

Response to Amendment

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 1-4, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima et al (US 5,589,116), and further in view of Takahashi (US 6,217,969 as cited on IDS).

Regarding claims 1 and 2, Kojima teaches a sintered silicon carbide body where the weight ratio of silicon carbide ranges from about 50% to about 80% by weight of

silicon carbide, about 0%-30% by weight of reacted silicon carbide phase, and about 0%-40% by weight of silicon phase (col. 4, ln. 5-12).

The Examiner takes the position that Kojima teaches, thru the ranges of weight ratios, the volume ratio of silicon carbide indicated by the Applicant in claims 1 and 2. Also the Examiner takes the position that the silicon carbide sintered body of Kojima can be used as a target.

Kojima also teaches a sputtering target with a silicon carbide powder comprising a mixture of a silicon carbide powder having an average particle size of about 0.5-20 microns (col. 3, ln. 35-36), but is silent on using two different particles sizes.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Kojima by incorporating particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

Regarding claim 3, Kojima teaches a sputtering target containing silicon carbide and silicon prepared by a reaction sintering method (col. 9, ln. 40-54).

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. MPEP 2113.

Regarding claim 4, Kojima teaches a weight ratio of impurities contained in the silicon is about 1 ppm or less (col. 4, ln. 8-10). Since this range would include zero impurities this range is anticipated by Kojima.

Regarding claim 9, Kojima teaches the volume ratio of silicon carbide is about 50% (col. 4, ln. 5-12). The Examiner takes the position that the conversion from weight percent to volume percent would fall within the range taught by Kojima.

Kojima also teaches a sputtering target with a silicon carbide powder comprising a mixture of a silicon carbide powder having an average particle size of about 0.5-20 microns (col. 3, ln. 35-36), but is silent on using two different particles sizes.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Kojima by incorporating particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

The Examiner takes the position that it would have been obvious to one having ordinary skill in the art at the time the invention was made to mix a silicon carbide power having 2.3 micron diameter and a silicon carbide power having 16.4 micron diameter in a volume ratio equal to 50/50, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 10, Kojima teaches the volume ratio of silicon carbide is about 70% (col. 4, ln. 5-12).

Kojima also teaches a sputtering target with a silicon carbide powder comprising a mixture of a silicon carbide powder having an average particle size of about 0.5-20 microns (col. 3, ln. 35-36), but is silent on using two different particles sizes.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Kojima by incorporating particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

The Examiner takes the position that it would have been obvious to one having ordinary skill in the art at the time the invention was made to mix a silicon carbide power

having 2.3 micron diameter and a silicon carbide power having 16.4 micron diameter in a volume ratio equal to 70/30, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

8. Claims 7, 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Endo et al (JP 2001-146494) in view of Takahashi (as cited on IDS).

Regarding claim 7, Endo teaches a method for manufacturing a silicon carbide sintered body comprising:

- dispersing a silicon carbide powder and a carbon source into a solvent to provide a mixed powder in a slurry form (Abstract of Endo; Machine Translation of Endo pg. 8, [0041]),
- pouring the resulting mixed powder into a mold and drying the same to obtain a green material (Abstract of Endo; Machine Translation of Endo pg. 8, [0042]),
- calcinating the resulting green material at about 1200 to about 1800 deg. C under a vacuum or inert gas atmosphere to obtain a calcined material (Machine Translation of Endo pg. 6, [0035]; pg. 8, [0042]), and
- impregnating the resulting calcined material with molten metallic silicon by capillary action to react free carbon in the calcined material with the silicon aspirated into the calcined material due to the capillary action phenomenon thereby obtaining a silicon carbide material ((Abstract of Endo; Machine Translation of Endo pg. 8, [0044]).

Endo does not explicitly teach a silicon carbide powder of the sizes required by Applicant.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Takahashi to incorporate particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

Regarding claim 11, Endo does not explicitly teach the volume ratio of the mixture of silicon carbide powder having 2.3 micron diameter and a silicon carbide power having 16.4 micron diameter is equal to 50/50.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of forming the sputtering target of Endo by incorporating particles of two different average sizes, as taught by Takahashi, because

it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

The Examiner takes the position that it would have been obvious to one having ordinary skill in the art at the time the invention was made to mix a silicon carbide power having 2.3 micron diameter and a silicon carbide power having 16.4 micron diameter in a volume ratio equal to 50/50, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claim 12, Endo does not explicitly teach the volume ratio of the mixture of the silicon carbide powder having 2.3 micron diameter and a silicon carbide power having 16.4 micron diameter is equal to 70/30.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Kojima by incorporating particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

The Examiner takes the position that it would have been obvious to one having ordinary skill in the art at the time the invention was made to mix a silicon carbide power

having 2.3 micron diameter and a silicon carbide power having 16.4 micron diameter in a volume ratio equal to 70/30, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima and further in view of Endo (JP 2001-146494) and Takahashi (as cited on IDS).

Regarding claim 7, Kojima teaches a method for manufacturing a silicon carbide sintered body comprising:

- dispersing a silicon carbide powder and a carbon source into a solvent to provide a mixed powder in a slurry form,
- pouring the resulting mixed powder into a mold,
- calcinating the resulting green material at about 1200 to about 1800.degree. C. under a vacuum or inert gas atmosphere to obtain a calcined material (col. 9, ln. 26-39), and
- impregnating the resulting calcined material with molten metallic silicon by capillary action to react free carbon in the calcined material with the silicon aspirated into the calcined material due to the capillary action phenomenon thereby obtaining a silicon carbide material (col. 9, ln. 40-54).

Kojima does not teach the step of drying the slurry mixed power.

Endo teaches a method comprising dissolving silicon carbide power in a solvent, pouring the formed silicon carbide slurry into a mold and drying the slurry (Abstract of Endo; Machine Translation of Endo pg. 8, [0042]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Kojima with a step for drying the slurry, as taught by Endo because it would promote contact between the silicon carbide particles, remove moisture, and increase contact strength (Machine Translation of Endo pg. 8, [0042]).

Neither Endo nor Kojima explicitly teach the particle sizes of silicon carbide as required by Applicant.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Takahashi to incorporate particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

10. Claims 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kojima and Takahashi as applied to claim 1 above, and further in view of Nagasawa (JP 08-183635).

Kojima teaches a silicon carbide reaction sintered body (Abstract).

Neither reference explicitly teaches forming a covering layer on a glass plate.

Regarding claim 5, Nagasawa teaches a covering layer (SiC film) formed on a glass substrate (Abstract of Nagasawa). The volume resistivity of about 3.0 x 10^3 (.OMEGA/cm) or less, and the refractive index of 4.16 or less measured at an optical wavelength of 633 nm, of the covering layers formed on glass substrate would be inherent to the SiC film formed on the glass substrate.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Kojima and Takahashi with a covering layer, as taught by Nagasawa, because it would be useful as an X-ray mask, phase shift mask, a substrate for a TFT or optical magnetic recording media or in other areas where a transparent conductive film is needed (Machine Translation of Nagasawa, pg. 2-3, [0009]).

Double Patenting

11. Claim 7 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 7,335,330 in view of Takahashi (as cited on IDS). Although the conflicting claims are not identical, they are not patentably distinct from each other because the Patent '330 is directed to a method of making a sintered silicon carbide compact, which may be used as a target. Patent '330 does not explicitly teach the use of two different sized powders in the method of making the silicon carbide target.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide

during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Takahashi to incorporate particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

12. Claims 1-12 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 9-15 of U.S. Patent No. 6,632,761 in view of Takahashi (as cited in IDS). Although the conflicting claims are not identical, they are not patentably distinct from each other because the Patent '761 is directed to a sintered silicon carbide body that uses a particle size and volume ratio range encompassed by the claims of the instant application.

Takahashi teaches the use of silicon carbide powder of two different size particles to increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60). Takahashi also teaches a particle size of silicon carbide of 2 microns (col. 11, ln. 54; col. 13, ln. 5).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the sputtering target of Takahashi to incorporate particles of two different average sizes, as taught by Takahashi, because it would increase the packing density of particles and the reactivity of silicon carbide during the preparation of the sintered silicon carbide (col. 3, ln. 51-60).

Response to Arguments

13. Applicant's arguments with respect to claims 1-8 have been considered but are moot in view of the new ground(s) of rejection.

14. Regarding claims 1 and 7 Applicant has amended the claims to incorporate claim 6, and on page 8 of the reply argues the target as claimed has superior characteristics. Such as when the flow rate of oxygen and nitrogen gas is changed or the amount of power to the target is controlled the properties of the covering layer may be adjustable over a wide range. Also argued is that the sputtering target as claimed would be compatible with a DC power source.

Regarding claims 1 and 7, the Examiner has cited Kojima and Takahashi, and Endo and Takahashi, respectively in response to the Applicant's amendment.

In response to applicant's argument that the sputtering target has superior characteristics, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Here, both the power supplied to the target and flow of process gas are known in the art to be independently adjustable, and such adjustments would affect the properties of the covering layer (material worked upon, MPEP 2115). Also the Examiner takes the position that the target of Kojima and Takahashi would be capable of using a direct current as a power source.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Brayton whose telephone number is (571)270-3084. The examiner can normally be reached on 7:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Nam X Nguyen/
Supervisory Patent Examiner, Art Unit 1753

/J. B./
Examiner, Art Unit 1795